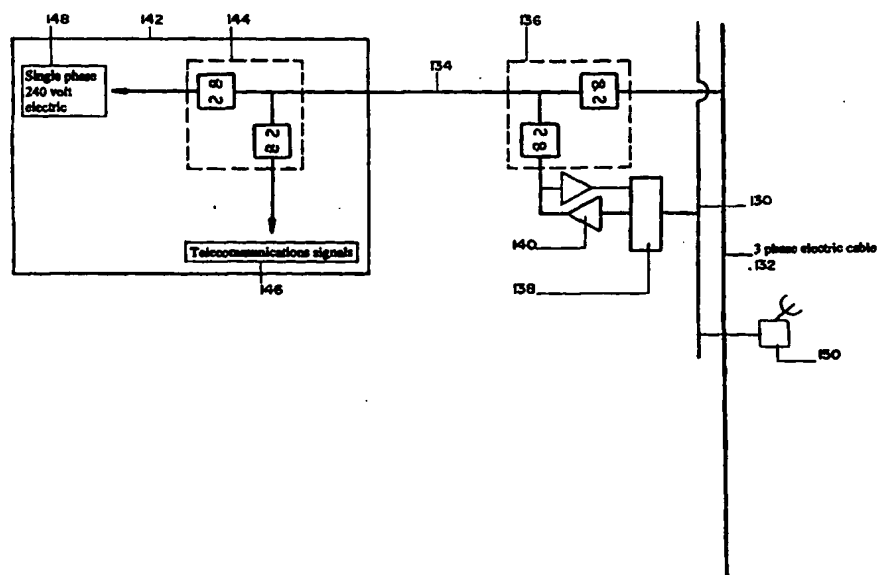


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04B 3/54	A1	(11) International Publication Number: WO 95/29536 (43) International Publication Date: 2 November 1995 (02.11.95)
(21) International Application Number: PCT/GB95/00893 (22) International Filing Date: 20 April 1995 (20.04.95) (30) Priority Data: 9407935.7 21 April 1994 (21.04.94) GB (71) Applicant (for all designated States except US): NORWEB PLC [GB/GB]; Talbot Road, Manchester M16 0HQ (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): BROWN, Paul, Anthony [GB/GB]; 30 Applerigg, Kendal, Cumbria LA9 6EA (GB). (74) Agents: HACKNEY, Nigel, J. et al.; Mewburn Ellis, York House, 23 Kingsway, London WC2B 6HP (GB).		(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG). Published <i>With international search report.</i>

(54) Title: HYBRID ELECTRICITY AND TELECOMMUNICATIONS DISTRIBUTION NETWORK



(57) Abstract

A telecommunications network is disclosed for linking a plurality of premises, comprising, typically, a fibre optic or coaxial cable (130), and a plurality of electrical power cables (134) each connected to a respective one of the premises for supplying mains electrical power thereto. Each of the power cables (134) is also connected to the fibre optic or coaxial cable (130) so that telecommunications signals are transmissible between the fibre optic or coaxial cable and each of the power cables. A telecommunications signal is transmissible to the plurality of premises by being transmitted along the fibre optic or coaxial cable and subsequently along the respective power cable of each of the premises.

A telecommunications network is disclosed for linking a plurality of premises, comprising, typically, a fibre optic or coaxial cable (130), and a plurality of electrical power cables (134) each connected to a respective one of the premises for supplying mains electrical power thereto. Each of the power cables (134) is also connected to the fibre optic or coaxial cable (130) so that telecommunications signals are transmissible between the fibre optic or coaxial cable and each of the power cables. A telecommunications signal is transmissible to the plurality of premises by being transmitted along the fibre optic or coaxial cable and subsequently along the respective power cable of each of the premises.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 95/00893

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04B3/54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04B H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,4 479 033 (BROWN ET AL) 23 October 1984	1,2,6
Y	see column 4, line 22 - line 44; figures 1,2 see column 5, line 10 - line 57 see column 8, line 59 - line 67; figure 7	7,9-13
Y	WO,A,93 07693 (PHONEX CORPORATION) 15 April 1993 see page 1, line 35 - page 2, line 3	7,9-13
A	PATENT ABSTRACTS OF JAPAN vol. 11 no. 209 (E-521) ,7 July 1987 & JP,A,62 030428 (KASPRO DENKOH CORP.) 9 February 1987, see abstract	2

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

29 June 1995

Date of mailing of the international search report

07.07.95

Name and mailing address of the ISA

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Authorized officer

Bossen, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 95/00893

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4479033	23-10-84	US-A- 4495386	22-01-85
WO-A-9307693	15-04-93	US-A- 5319634	07-06-94
		AU-A- 2861392	03-05-93
		BR-A- 9206605	28-03-95
		CA-A- 2119378	15-04-93
		EP-A- 0607304	27-07-94
		JP-T- 7501663	16-02-95

PCT

08/727505

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference NJH/MP7059553	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/GB95/00893	International filing date (day/month/year) 20/04/95	(Earliest) Priority Date (day/month/year) 21/04/94
Applicant NORWEB PLC et al.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (see Box I).

2. ☐ Unity of invention is lacking (see Box II).

3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the title, ☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is:

Figure No. 13 ☒ as suggested by the applicant.

☐ None of the figures.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 95/00893

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H04B3/54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04B H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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Y	WO,A,93 07693 (PHONEX CORPORATION) 15 April 1993 see page 1, line 35 - page 2, line 3 ---	7,9-13
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

29 June 1995

Date of mailing of the international search report

07.07.95

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+ 31-70) 340-3016

Authorized officer

Bossen, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 95/00893

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4479033	23-10-84	US-A- 4495386	22-01-85
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		BR-A- 9206605	28-03-95
		CA-A- 2119378	15-04-93
		EP-A- 0607304	27-07-94
		JP-T- 7501663	16-02-95

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 95/00893

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04B3/54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04B H04M

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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	WO,A,93 07693 (PHONEX CORPORATION) 15 April 1993 see page 1, line 35 - page 2, line 3 ---	7,9-13
A	PATENT ABSTRACTS OF JAPAN vol. 11 no. 209 (E-521) ,7 July 1987 & JP,A,62 030428 (KASPRO DENKOH CORP.) 9 February 1987, see abstract -----	2

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

29 June 1995

Date of mailing of the international search report

07.07.95

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+ 31-70) 340-3016

Authorized officer

Bossen, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 95/00893

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4479033	23-10-84	US-A- 4495386	22-01-85
WO-A-9307693	15-04-93	US-A- 5319634	07-06-94
		AU-A- 2861392	03-05-93
		BR-A- 9206605	28-03-95
		CA-A- 2119378	15-04-93
		EP-A- 0607304	27-07-94
		JP-T- 7501663	16-02-95

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Washington D.C. 20231
United States of America

in its capacity as elected Office

Date of mailing (day/month/year)

24 November 1995 (24.11.95)

International application No.

PCT/GB95/00893

Applicant's or agent's file reference

NJH/MP705955

International filing date (day/month/year)

20 April 1995 (20.04.95)

Priority date (day/month/year)

21 April 1994 (21.04.94)

Applicant

BROWN, Paul, Anthony

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

13 November 1995 (13.11.95)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

F. Gateau

Telephone No.: (41-22) 730.91.11

PCT

22
REC'D 08 JUL 1996

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NJH/MP7059553	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB 95/ 00893	International filing date (day/month/year) 20/04/1995	Priority date (day/month/year) 21/04/1994
International Patent Classification (IPC) or national classification and IPC H04B3/54		
Applicant NORWEB PLC et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


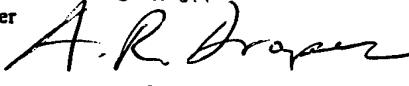
2. This **REPORT** consists of a total of 7 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consists of a total of 3 sheets.

3. This report contains indications and corresponding pages relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 13/11/1995	Date of completion of this report 04.07.96
Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	Authorized officer  A. Draper Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

Intern. application No.

PCT/GB95/00893

I. Basis of the report

1. This report has been drawn up on the basis of (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.):

☐ the international application as originally filed.

☒ the description, pages 1-31 _____, as originally filed,
pages _____, filed with the demand,
pages _____, filed with the letter of _____,
pages _____, filed with the letter of _____.

☒ the claims, Nos. _____, as originally filed,
Nos. _____, as amended under Article 19,
Nos. _____, filed with the demand,
Nos. 1-7 _____, filed with the letter of 17/6/96____,
Nos. _____, filed with the letter of _____.

☒ the drawings, sheets/fig 1/14-14/14 _____, as originally filed,
sheets/fig _____, filed with the demand,
sheets/fig _____, filed with the letter of _____,
sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____.
☒ the claims, Nos. 8-13 _____.
☐ the drawings, sheets/fig _____.

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been and will not be examined in respect of:

☐ the entire international application,

☒ claims Nos. 7 _____

because:

☐ the said international application, or the said claims Nos. _____ relate to the following subject matter which does not require an international preliminary examination (specify):

☒ the description, claims or drawings (indicate particular elements below) or said claims Nos. 2 _____ are so unclear that no meaningful opinion could be formed (specify):

It is impossible to determine from a figure what is the intended scope of a claim (see Rule 6.2(a)).

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for said claims Nos. _____.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims 1-6 _____	YES
	Claims _____	NO
Inventive Step (IS)	Claims 1-6 _____	YES
	Claims _____	NO
Industrial Applicability (IA)	Claims 1-6 _____	YES
	Claims _____	NO

2. CITATIONS AND EXPLANATIONS

- 1). The nearest prior art is considered to be US-A-4 479 033 (D1) which discloses transmission of telecommunications signals over a combination of a telecommunications network and the power supply cable of a premises.
 - 2). Present claim 1 differs from D1 inter alia in that a plurality of premises is explicitly involved in the network and that the power cables are external to the premises. Further, the system of D1 utilises a conventional telephone line rather than a broadband telecommunications network. In addition the technical problem to be solved is not comparable so the skilled person could not be expected to draw on the teachings of D1. In D1 the problem set is to extend the flexibility of an internal telephone system. In the present case the objective is to link a broadband telecommunications network into a premises in an economically advantageous manner.
 - 3). Independent method claim 5 involves an inventive step
-

for similar reasons.

- 4). Claims 2, 3, 4 and 6 relate to advantageous embodiments.

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

- 1). Concerning the incorporation by reference at the top of page 2 of the description of PCT/GB93/02163 the applicant should note the following (from PCT Guidelines 4.17 and 4.17a):

" References in international applications to other documents may relate either to the background art or to a part of the disclosure of the invention. Where the reference relates to the background art, it may be in the application as originally filed or introduced at a later date (see Chapter II, paragraphs 4.4 and 4.5). Where the reference relates directly to the disclosure of the invention (e.g., details of one of the components of a claimed apparatus) then, if it is to be taken into account in respect of Article 5, it must be in the application as originally filed and clearly identify the document referred to in such a manner that the document can be easily retrieved. If matter in the document referred to is essential to satisfy the requirements of Article 5, this matter should be incorporated in the description, because the patent specification should, regarding the essential features of the invention, be self-contained, i.e., capable of being understood without reference to any other document.

- 4.17a A reference to an unpublished, previously filed application (i.e., not published before the international filing date) should not be regarded as being part of the disclosure, unless the application referred to is made available to the public on or before the publication date of the international application. The reference to such an application made available to the public on or before the publication date of the international application may be replaced by the actual text referred to

and may be taken into account by the examiner. Similarly, references to text books and periodicals are allowable under the same conditions if it can be proved that the content thereof was fixed prior to the international filing date. In the case of any document made available to the public later than the publication date of the international application or not to be published at all (e.g., an application withdrawn before publication), the examiner should not take into account the reference to that document for the purposes of international preliminary examination. It should be noted, however, that this practice relates only to the international phase and does not preclude any decision applying relevant national law as far as it relates to the contents of the disclosure of the international application as filed.

- 2). With regard to claim 7, reference is made to section III of this report.

What is claimed is:

1. Power line communication apparatus comprising;

modulator means for modulating a carrier signal having a

first frequency;

transmitter means coupled to said modulator means for transmitting said modulated carrier signal having said first frequency to coupler means and;

coupler means comprising capacitor means electrically connected to a power line and air-core transformer means coupled to said transmitter means, said transformer means transmitting said modulated carrier signal having said first frequency through said capacitor means and over said power line.

2. The power line communication apparatus of claim 1 wherein said transformer means comprises a primary coil having a first diameter, said primary coil being coupled to said capacitor means, and a secondary coil having a second smaller diameter, said secondary coil extending coaxially within said primary coil such that an air gap is created between said primary and said secondary coils.

3. The power line communication apparatus of claim 1 wherein said air-core transformer functions as a capacitively coupled transformer, having a capacitor between the primary and secondary coils of the transformer.

4. The power line communication apparatus of claim 1 further comprising second coupler means comprising second capacitor means and second air-coil transformer means for receiving carrier signals having a second frequency over a power line;

receiver means connected to said coupler means for receiving said carrier signals having a second frequency from said coupler means;

and demodulator means for processing said carrier signal having a second frequency received from said receiver means.

5. The communications apparatus according to claim 2 wherein the ratio of the number of turns of said primary to secondary coils is about one to one.

6. The communications apparatus according to claim 2 wherein a static capacitance is created between the primary and

secondary windings of said coils which function as a high-pass filter with the secondary windings.

7. The power line communication means of claim 4 wherein said second air-coil transformer means comprises a primary coil having a first diameter, said primary coil being coupled to said capacitor means and a secondary coil having a second smaller diameter, said second coil extending coaxially within said primary coil such that an air gap is created between said primary and said secondary coils.

8. The communication apparatus according to claim 1, wherein said first frequency is less than about 1 Megahertz.

9. The communication apparatus according to claim 1, wherein said first frequency that is less than about 160 kilohertz.

10. The communication apparatus according to claim 1, wherein said first frequency comprises a power level of about twenty decibels above any other frequency.

11. The communication apparatus according to claim 2 wherein said air-coil transformer means comprises impedance matching means such that the primary coil resistivity for transmission and reception at carrier frequency is about equal to the input impedance of the power line.

12. The communications apparatus according to claim 1, wherein said coupler means resonates at said first carrier frequency.

13. The power line communication apparatus of claim 1 wherein said transmitter means simultaneously transmits at least a second carrier signal having a second frequency through said coupler means.

14. Power line communication apparatus comprising;
modem means for transmitting first carrier signals having a first frequency over a power line for receiving second carrier signals having a second frequency from a power line; and
coupler means connected between said modem means and said power line, said coupler means including air-coil transformer means for transmitting or receiving said first and second carrier signals over said power line.

15. Communication apparatus for a pair of power-lines,

comprising:

first coupling means, including a pair of serial LC circuits, coupled to the pair of power-lines;

first transmitter means, coupled to said first coupling means, for transmitting signals carried by a first carrier frequency across the pair of power-lines;

first receiver means, coupled to said first coupling means, for receiving signals carried by a second carrier frequency from the pair of power-lines;

first modem means, coupled between said first transmitter means and said first receiver means, for modulating said signals to be carried by said first carrier frequency and for demodulating said signals carried by said second carrier frequency;

second coupling means, including a pair of serial LC elements, coupled to the pair of power-lines;

second transmitter means, coupled to said second coupling means, for transmitting said signals to be carried by said second carrier frequency across the pair of power-lines;

second receiver means, coupled to said second coupling means, for receiving said signals carried by said first carrier frequency from the pair of power-lines; and

second modem means, coupled between said second transmitter means and said second receiver means, for modulating said signals to be carried by said second carrier frequency and for demodulating said signals carried by said first carrier frequency.

16? The duplexing apparatus according to claim 15, wherein one of said serial LC circuits of both of said first and second coupling means comprises a first plurality of capacitors and a first air coil including primary and secondary windings, the diameter of said primary winding being greater than the diameter of said secondary winding thereby creating an air coil between said primary and secondary windings, while the other serial LC circuit comprises a second plurality of capacitors and a second air coil including primary and secondary windings, the diameter of said primary winding being greater than the diameter of said secondary winding thereby creating an air core between said

primary and secondary windings, wherein said first plurality of capacitors are connected together in parallel between one of the power-lines and said primary winding of said first air coil, said primary winding of said first air coil thereafter being serially connected to the other power-line, and said secondary winding of said first air coil is connected to its respective transmitter means, and wherein said second plurality of capacitors are serially connected together between said one of the power-lines and said primary winding of said second air coil, said primary winding of said second air coil thereafter serially connected to the other power-line.

17. The communications apparatus according to claim 15, wherein said first and second coupling means each have a bandwidth of less than about 500 kilohertz.

18. The communications apparatus according to claim 15, wherein said first and second coupling means each have a bandwidth of less than about 100 kilohertz.

19. The communications apparatus according to claim 15 wherein the primary and secondary windings of said first and second air coils function as a phase shift non-linear transformer.

20. The communications apparatus according to claim 15 wherein the primary and secondary windings of said first and second air coils function as a capacitively coupled transformer.

21. The communications apparatus according to claim 15 wherein the ratio of the number of turns of said primary to secondary coil in said first air coil means is about one to one.

22. The communications apparatus according to claim 15 wherein the ratio of the number of turns of said primary to secondary coil in said second air coil means is about one to one.

23. The communications apparatus according to claim 15 wherein the created capacitance created between the primary and secondary windings of said air coils function as a high-pass filter with the secondary windings.

24. The communications apparatus according to claim 15 wherein the primary windings with the plurality of capacitors function as a band-pass filter.

25. The communications apparatus according to claim 15

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wherein said first plurality of capacitors includes resistor means to evenly divide down the voltage over said first plurality of capacitors.

26. The communication apparatus according to claim 25 wherein said second plurality of capacitors includes resistor means to evenly divide down the voltage over said second plurality of capacitors.

27. The communication apparatus according to claim 25 wherein said first plurality of capacitors resonates with the primary winding of said first air coil.

28. The communication apparatus, according to claim 25 wherein said second plurality of capacitors resonates with the primary winding of said first air coil.

29. In a power line communication apparatus, an improved coupler comprising capacitor means coupled to a power line and air-core transformer means comprising a primary coil having a first diameter, said primary coil being coupled to said capacitor means, and a secondary coil extending coaxially within said primary coil such that an air gap is created between said primary and secondary coils.

CLAIMS:-

1. A network linking a plurality of premises (142),
comprising:
- 5 a section of broadband telecommunications network
(130), and
a plurality of electrical power cables (134) each
connected to a respective one of the premises for
supplying mains electrical power thereto, and each
10 being entirely external to said plurality of premises,
each of said power cables also being connected to
the section of broadband telecommunications network so
that telecommunications signals are transmissible
between the section of broadband telecommunications
15 network and each of said power cables,
wherein a telecommunications signal is
transmissible to and/or from said plurality of premises
by being transmitted along the section of broadband
telecommunications network and also along the
20 respective power cable of each of said premises.
2. A network according to Claim 1 further including
satellite receiving means for receiving
telecommunications signals from a satellite transmitter,
wherein a telecommunications signal is transmissible from
said satellite transmitter to said plurality of premises
via said satellite receiving means, said section of
broadband telecommunications network and said power
cables.

3. A network according to Claim 1 or Claim 2 including
a plurality of interface units, each of said interface
units connecting one of said power cables to said section
of broadband telecommunications network, each of said
5 interface units including high pass filter means for
allowing high frequency telecommunications signals to
pass between said section of broadband telecommunications
network and said power cable, and for preventing low
frequency mains electrical power signals from passing
10 therebetween.

4. A network according to any one of the above claims
15 wherein said section of broadband telecommunications
network includes any or all of fibre optic, twisted pair
or co-axial cable.

5. A method of transmitting a telecommunications signal
between a pair of buildings, including the steps of:
20 (I) transmitting the signal from a first building along
an external power cable for supplying mains power to the
first building, followed by
(ii) transmitting the signal along a section of broadband
telecommunications network, followed by
25 (iii) transmitting the signal along a second external
power cable for supplying mains electrical power to the
second building.

6. A method of transmitting a telecommunications signal according to Claim 5 wherein the carrier frequency of said telecommunications signal is at least 1MHz.
7. A network substantially as herein described with reference to Figure 13 of the accompanying drawings.

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